B978-0-7020-4443-4.00012-1, 00012

AUTHOR QUERY FORM

ELSEVIER	**Book: Evidence-Based Physical Therapy for the Pelvic Floor** **Chapter: 00012**	**Please e-mail your responses and any corrections to:** **E-mail: a.collett@elsevier.com**

Dear Author,

Any queries or remarks that have arisen during the processing of your manuscript are listed below and are highlighted by flags in the proof. (AU indicates author queries; ED indicates editor queries; and TS/TY indicates typesetter queries.) Please check your proof carefully and answer all AU queries. Mark all corrections and query answers at the appropriate place in the proof (e.g., by using on-screen annotation in the PDF file http://www.elsevier.com/book-authors/science-and-technology-book-publishing/overview-of-the-publishing-process) or compile them in a separate list, and tick off below to indicate that you have answered the query.
Please return your input as instructed by the project manager.

Uncited references: References that occur in the reference list but are not cited in the text. Please position each reference in the text or delete it from the reference list.

"Gross et al., 2000", "Patel et al., 2001a", "Patel et al., 2001b", "Sze et al., 2000";

Missing references: References that occur in the reference list but are not cited in the text. Please position each reference in the text or delete it from the reference list.

"Tibaek 2004, 2005, 2007", "McClurg 2006, 2008, 2010, 2011", "Khan 2010", "Lucio 2010, 2011", "Peasad 2003", "Vahtera 1997", "Skeil 2001", "Sakakibara 1996", "Gross 2000", "Sze 2000"

Location in Chapter	Query / remark
AU:1, page 3	0% or not reported?
AU:2, page 4	omission? no treatment?
AU:3, page 6	please give in full for each term queried
TS:1, pages 2	Please fix "2001a" or "2001b" for this citation.
TS:2, page 7	Citation "Mayo & Cchetner 1992" is spelling mismatch with the reference list. Please check.

B978-0-7020-4443-4.00012-1, 00012

Chapter 12

c0060 # Evidence for pelvic floor physical therapy for neurological diseases

Marijke Van Kampen Inge Geraerts

CHAPTER CONTENTS

s0010 ## INTRODUCTION

p0035 Several neurological disease processes can cause changes in bladder and bowel function (Chancellor and Blaivas, 1995; Skeill, 2001). Bladder and bowel problems cause much anxiety and may reduce quality of life (Chancellor and Blaivas, 1995).

p0040 Treatment procedures of neurological patients with genitourinary and bowel problems are largely based on empirical evidence with a limited research base (Chancellor and Blaivas, 1995; Harari et al., 2004; Leboeuf and Gousse, 2004). An assessment of the patient's physical, psychological, cognitive and emotional limitations may influence the treatment strategy. Although many options exist for therapy, a stepwise approach with initially non-invasive treatment is important considering the course of the disease (Chancellor and Blaivas, 1995; Leboeuf and Gousse, 2004). The role of pelvic floor physical therapy for bladder and bowel problems in specific neurological diseases is actually more and more investigated. Eleven randomized controlled studies of pelvic floor physical therapy for stroke (Tibaek et al., 2004, 2005, 2007) and MS patients (Vahtera et al., 1997; Prasad, 2003; McClurg, 2006, 2008, 2010; Khan, 2010; Lucio, 2010, 2011) with bladder and bowel problems are published. Other neurological pathologies like Parkinson's disease, spina bifida, syringomyelia, peripheral neuropathies, Huntington's disease, multiple system atrophy, dementia, spinal cord injuries, disc prolapse and tumours of the spinal cord might also be responsible for the development of a neurogenic bladder and bowel dysfunctions. No randomized controlled trials on evidence for pelvic floor physical therapy in those neurological diseases can be found, although physical therapy of the pelvic floor in Parkinson's disease and spinal cord injury patients with partial lesion has been undertaken (Ishigooka et al., 1996; Vaughan et al., 2011).

p0045 This chapter is limited to treatment of stroke and MS patients with genitourinary and/or bowel problems.

STROKE s0015

Definition s0020

p0050 Stroke or cerebrovascular accident (CVA) is the clinical manifestation of ischemia or infarction of brain tissue caused by arterial occlusion, intracerebral and subarachnoid haemorrhage or congenital malformation (Flisser and Blaivas, 2004).

Incidence and prevalence s0025

p0055 Each year a typical health authority of 1000 men and women can expect two new stroke cases and four recurrent stroke patients and there will be approximately six survivors of stroke living in the community (Chancellor and Blaivas, 1995).

Urologic and bowel symptoms and urodynamic investigation s0030

p0060 Urinary incontinence (UI) was reported in 32–83% in the early period after stroke. A review of prevalence of incontinence was given by Brittain et al. (1998). The natural history

of UI following stroke knows a gradual, spontaneous improvement from 19% at 3 months, 15% at 1 year to 10% at 2 years (Patel et al., 2001). Jorgensen et al. (2005) found a prevalence of 17% UI among long-term survivors and 7% of the control subjects without stroke. Sakakibara (1996) performed micturitional histories and urodynamic investigation in 72 stroke patients. A total of 53% of the patients had one or more urinary symptoms within 3 months after stroke. Thirty-six per cent had nocturia followed by 29% with urgency incontinence and 25% with difficulty of voiding. Urodynamic investigation shows that initially after stroke the bladder is often areflexic (Flisser and Blaivas, 2004). Detrusor hyperreflexia and urgency incontinence generally follow. Sphincteric incontinence in the recovery phase is normally not a consequence of the stroke but is almost always a premorbid condition (Flisser and Blaivas, 2004).

p0065 Anal incontinence in stroke patients was reported in 23–40% of the cases on admission and 7–9% 6 months after stroke (Brocklehurst et al., 1985; Nakayama et al., 1997; Brittain et al., 1998; Krogh et al., 2001).

p0070 Initial incontinence is associated with age older than 75 years, visual field defect, dysphagia, motor weakness, severity of stroke, diabetes, hypertension and comorbidity of other diseases (Nakayama et al., 1997; Gross, 2000; Sze, 2000; Patel et al., 2001). Furthermore, UI in the acute stage is a predictor of survival and closely associated with disability severity (Patel et al., 2001). UI emerged as a risk factor for nursing home replacement (Patel et al., 2001; Pettersen et al., 2002).

s0035 Pathophysiology

p0075 Not all incontinence after stroke is directly related to neurologic injury of the micturition pathways. Other mechanisms are general impairment, cognitive deficits and overflow incontinence unrelated to stroke (Flisser and Blaivas, 2004). The neurophysiologic explanation for detrusor areflexia in the initial phase after stroke is unknown. Detrusor-hyperreflexia was noted in lesions of the frontal lobe as well as the basal ganglia. Uninhibited sphincter relaxation is typical for frontal lobe lesions and detrusor sphincter dyssynergia are common in the basal ganglia lesions (Sakakibara et al., 1996). The location of the injury, the extent of the damage and the role of the affected area determine the precise urologic impact (Flisser and Blaivas, 2004). Rationale for physical therapy after stroke can be explained because patients have problems of urgency, stress and urge incontinence. The aim of physical therapy is to strengthen or to relax the pelvic floor muscles and to reduce frequency, urgency and nocturia.

s0040 Treatment: evidence for effect (prevention and treatment)

p0080 There has been little research into treatment of urinary and faecal incontinence and constipation in stroke survivors. Wikander et al. (1998) concluded that incontinence reduced significantly after a special multidisciplinary programme in comparison with a control group treated with a conventional rehabilitation programme. The special multidisciplinary programme contained physical training (dressing, transfer in the hospital and at home with attention to bladder and bowel management), social and cognitive interaction (memory training, problem solving, social interaction, expression and comprehension). Harari et al. (2004) concluded that a single clinical/educational nurse intervention in stroke patients effectively improved bowel dysfunctions up to 6 months later and bowel modifying lifestyle behaviours up to 12 months later.

p0085 The effect of pelvic floor muscle training on incontinence in stroke patients was evaluated in three randomized controlled studies (Tibaek et al., 2004, 2005, 2007). In fact, this is one RCT of 26 incontinent women reported in two publications because two different assessment tools were used. A third study investigated the 6-month long-term effect of 24 of these women on quality of life (QoL) (Table 12.1). The effect of pelvic floor exercises in women with UI after stroke was measured by QoL parameters (Tibaek et al., 2004) and by diary for the frequency of voiding, incontinence episodes and number of pads, 24-hour home pad-test and vaginal palpation of pelvic floor muscles (Tibaek et al., 2005). The intervention included groups treatment during 12 weeks comprising of 12–24 standardized pelvic floor exercises. The control group followed the normal standard programme of stroke rehabilitation without specific treatment of UI.

p0090 In the first study, QoL measured with the Short Form 36 Health Survey Questionnaire (SF-36) and Incontinence Impact Questionnaire (IIQ-7) did not show significant difference between the two groups after 12 weeks (Tibaek, 2004).

p0095 In the second study, a significant improvement of frequency of voiding ($p = 0.028$), 24-hour home pad-test ($p = 0.013$) and endurance of pelvic floor muscles ($p = 0.028$) was demonstrated in the treatment group compared with the control group (Tibaek, 2005).

p0100 In the third study, QoL was measured with the Short Form 36 Health Survey Questionnaire (SF-36) and the Incontinence Impact Questionnaire (IIQ-7). A trend to a long-lasting effect regarding role limitations because of emotional problems (SF-36) and a tendency to a decreased impact of UI compared with the control group (IIQ-7) were found (Tibaek, 2007).

p0105 The methodological quality was 5 out of 10 on the Pedro scale; neither the patients nor the therapist or assessor were blind to the study (Table 12.2). Other limitations of the study are a small sample size, 12 women in each group. In the first study (Tibaek et al., 2004), the instruments to document the effect are not the optimal choice because the SF-36 gives an indication of general health and the IIQ turned out to be rather insensitive towards women with urge urinary incontinence. Remarkable is the fact that only 8% of the 339 stroke patients were potential candidates for pelvic floor physical therapy, mostly because of their neurological status (Tibaek et al., 2004, 2005).

B978-0-7020-4443-4.00012-1, 00012

t0010 **Table 12.1 Randomized controlled studies of physical therapy for bladder and bowel dysfunctions in neurogenic patients**

Stroke	
Author	Tibaek et al., 2004
Design	2-arm RCT Experimental group (E): PFMT Control group (C): no treatment for incontinence
n	26 women (E = 14, C = 12), mean age 60 years (range: 56–74) with stroke
Diagnosis	Short Form 36 Health Survey Questionnaire (SF-36) and Incontinence Impact Questionnaire (IIQ-7
Training protocol	E: PFMT 6 s contraction, 6 s rest, 3 s contraction, 3 s rest, 30 s contraction, 30 s rest; Every contraction: 4–8 times in different positions, group-treatment (6–8 patients) 1 h/week during 12 weeks outpatient; individual: vaginal palpation 2–3 times over 12 weeks Home exercises: 1–2 times daily C: no treatment for UI but normal standard programme for rehabilitation
Drop-out	8%
Results	No significant difference between E and C group in SF-36 and IIQ-7
Author	Tibaek et al., 2005
Design	2-arm RCT Experimental group (E): PFMT Control group (C): no treatment for incontinence
n	26 women (E = 14, C = 12), mean age 60 years (range: 56–74) with stroke
Diagnosis	Voiding diary, UI 24-h pad-test, number of pads, digital palpation of pelvic floor muscles
Training protocol	E: PFMT 6 s contraction, 6 s rest, 3 s contraction, 3 s rest, 30 s contraction, 30 s rest Every contraction: 4–8 times in different positions; group-treatment (6–8 patients) 1 h/week during 12 weeks outpatient; individual: vaginal palpation 2–3 times in 12 weeks Home exercises: 1–2 times daily C: no treatment for UI but normal standard programme for rehabilitation
Drop-out	8%
Results	Significant difference between E and C group in frequency of voiding ($p = 0.028$), 24-h home pad-test ($p = 0.013$)and endurance of pelvic floor muscles ($p = 0.028$)
Author	Tibaek et al., 2007
Design	2-arm RCT Experimental group (E): PFMT Control group (C): no treatment for incontinence
n	24 women (E = 12, C = 12), mean age 60 years (range: 56–74) with stroke
Diagnosis	Short Form 36 Health Survey Questionnaire (SF-36) and Incontinence Impact Questionnaire (IIQ7)>6 mth later
Training protocol	Identical to Tibaek, 2004 and 2005
Drop-out	/
Results	No significant difference between E and C group in SF-36 and IIQ-7: only trend
MS	
Author	McClurg et al., 2006
Design	3-arm RCT Control group (C): PFMT and advice Experimental group (E): E1: + BF; E2: + BF+NMES
n	30 women with MS: C = 10, mean age 49 years; E1 = 10, mean age 52 years; E2 = 10, mean age 49 years (range: 33–67)
Diagnosis	Leakages on voiding diary, 24-h pad-test, uroflowmetry, PF assessment (PERFECT scheme) and IIQ, UDI, KHQ, MSQoL. Assessment at week 0, 9, 16, 24

(Continued)

AU1

Comp. by: KARajakumari Stage: Proof Chapter No.: 12 Title Name: BO
Page Number: 3 Date: 31/05/2014 Time: 05:29:00

B978-0-7020-4443-4.00012-1, 00012

Table 12.1 Randomized controlled studies of physical therapy for bladder and bowel dysfunctions in neurogenic patients—cont'd

Training protocol	Treatment during 9 weeks C: advice+PFMT gradually, 5 times a day; E1: + BF, E2: + BF+NMES ES=biphasic CC, two parameter settings 250 µs, 40 Hz, 5 s on, 10 s off/ 450 µs, 10 Hz, 10 s on, 3 s off; duration from 5 to 30 minutes daily
Drop-out	2/30
Results	Significant difference in favour of E2 compared with C at 9, 16 and 24 weeks for leakages, 24-h pad-test, digital assessment en in some parts of the questionnaires ($p < 0.05$) Significant difference in favour of E1 compared with C for leakages, 24-h pad-test, digital assessment in some parts of the questionnaires ($p < 0.05$) at 16 and 24 weeks
Author	McClurg et al., 2008
Design	2-arm RCT C: PFMT, BF and placebo ES E: PFMT, BF and ES
n	74 women with MS: C=37, mean age 52 years; E=37, mean age 48 years (range: 27–72)
Diagnosis	Leakages on voiding diary, 24-h pad-test, uroflowmetry, PF assessment (PERFECT scheme), EMG, VAS, IIQ, UDI, IPSS Assessment at week 0, 9, 16, 24
Training protocol	Treatment during 9 weeks PFMT, BF and ES ES=biphasic CC Two parameter settings: 250 µs, 40 Hz, 5 s on, 10 s off/ 450 µsec, 10 Hz, 10 s on, 3 s off; duration from 5 to 30 min daily
Drop-out	2/74
Results"	Significant difference in favour of E compared with C for leakages, 24-h pad-test, digital assessment and some parts of the questionnaires
Author	McClurg et al., 2010
Design	2-arm RCT E: Advice+abdominal massage C: Advice
n	30 women with MS and constipation; E=mean age 52 years; C=37, mean age 48 years (range: 27–72)
Diagnosis	CSS, neurogenic bowel dysfunction, bowel diary Assessment at week 0, 4, 8
Training protocol	Advice on bowel management Abdominal massage daily for 4 weeks
Drop-out	1/30
Results	Significant difference in favour of E compared with C for constipation symptoms ($p = 0.003$)
Author	Khan et al., 2010
Design	2-arm RCT Experimental group (E): bladder rehabilitation programme C: control group: no
n	74 women with MS; E=40, mean age 49 years; C=34, mean age 51 years (range: 29–65)
Diagnosis	Questionnaires: UDI-16, NDS, AUA, IIQ-7
Training protocol	E: multidisciplinary bladder rehabilitation programme during 1 year: or individualized inpatient (IP) or outpatient (OP) programme IP=3 h/day over 6 weeks, OP=30 min 2–3x/week Therapy: individual, assessment of bladder type, diary with strict fluid, PFME, timed voiding C: waitlist group with usual care
Drop-out	22%
Results	Significant difference between E and C group in all questionnaires ($p < 0,01$), improvement in bladder function, overactivity and QoL

AU2

Comp. by: KARajakumari Stage: Proof Chapter No.: 12 Title Name: BO
Page Number: 4 Date: 31/05/2014 Time: 05:29:00

Table 12.1 Randomized controlled studies of physical therapy for bladder and bowel dysfunctions in neurogenic patients—cont'd

Author	Lucio et al., 2010
Design	2-arm RCT Experimental group (E): PFMT Control group (C): sham treatment for LUTS
n	27 women with MS: E = 13, mean age 36 years; C = 14, mean age 34.7 years (range: 20–49)
Diagnosis	Urodynamics, 24-h pad-test, voiding diary, PF assessment (PERFECT scheme)
Training protocol	E: PFME with perineometer: 30 slow contractions, 3 min of fast contractions in supine position Treatment: 30 min, 2 times/week for 12 weeks outpatient Home exercises: 3 times daily 30 slow contractions, 3 min of fast contractions C: introduction of perineometer inside the vagina without contraction during 30 min
Drop-out	Not reported
Results	Significant difference between E and C group in 24-h pad-test ($p = 0.00$), number of pads ($p = 0.01$), nocturia ($p < 0.00$) and improvement of pelvic floor muscle power, endurance, resistance and fast contractions ($p < 0.00$) No significant difference in urodynamics
Author	Lucio et al., 2011
Design	2-arm RCT Experimental group (E): PFMT Control group (C): sham treatment for LUTS
n	35 women with MS: E = 18, mean age 36 years; C = 17, mean age 34.7 years (range: 20–49)
Diagnosis	OAB questionnaire, Medical outcomes study, ICIQ, Qualiveen questionnaire
Training protocol	E: PFME with perineometer: 30 slow contractions, 3 min of fast contractions in supine position Treatment: 30 min, 2 times/week for 12 weeks outpatient Home exercises: 3 times daily 30 slow contractions, 3 minutes of fast contractions C: introduction of perineometer inside the vagina without contraction during 30 min
Drop-out	Not reported
Results	Significant difference between E and C group in all questionnaires
Author	Prasad et al., 2003
Design	3-arm RCT Treatment (T): T1 = lower abdominal pressure, T2 = bladder stimulation C = no T for post-void RV
n	18 women and 10 men with MS and post-void RV Mean age 49 years (range: 29–71) All patients follow all treatments
Diagnosis	Post-void RV
Training protocol	T1 = lower abdominal pressure (Crede's manoeuvre) during 2 weeks T2 = bladder stimulation with bladder stimulator during 2 weeks; 1 minute after voiding C = no T during 2 weeks
Drop-out	2/30 after randomization
Results	No significant difference between T1 and T2 group but results reach significance in favour of vibration ($p = 0.059$) Significant difference between T2 and C group in RV ($p = 0.002$)
Author	Vahtera et al., 1997
Design	2-arm RCT Experimental group (E): PFMT and ES Control group (C): no treatment for LUTD
n	50 women and 30 men with MS (E = 40, C = 40); mean age 43 years (range: 25–68)
Diagnosis	LUTS by self-administered questionnaire, muscle activity by surface EMG-BF

(Continued)

Comp. by: KARajakumari Stage: Proof Chapter No.: 12 Title Name: BO
Page Number: 5 Date: 31/05/2014 Time: 05:29:00

Table 12.1 Randomized controlled studies of physical therapy for bladder and bowel dysfunctions in neurogenic patients—cont'd

Training protocol	E: PFMT: 3 s contraction, 3 s rest (10 times) 5 s contraction, 3 s rest (5 times) 15 s contraction, 30 s rest (5 times), others: 5 times in different positions ES: interferential currents carrier frequency of 2000 Hz treatment frequency of 5–10 Hz, 10–50 Hz and 50 Hz, 10 min of each frequency, 3 min rest, 6 sessions during 21 days outpatient BF: same PFMT after ES during 2 sessions; home exercises: 20 contractions 3–5 times/week during 6 mth in sitting and standing position C: no treatment
Drop-out	At 2 mth 2/40, at 6 mth 3/40 in the E group, not mentioned in control group
Results	Significant difference between E and C group in LUTS (incontinence, nocturia, urge) $p < 0.001$, QoL (travelling, social shame and need of pads) muscle activity $p < 0.01$.

AU3

KHQ, Kings Health Questionnaire; UDI, <stands for?>; CC <stands for?>; VAS, visual analogue score; IPSS, International Prostate Symptom Score; CSS, <stands for?>, NDS, <stands for?>; AUA, American Urological Association; ICIQ, International Consultation on Incontinence Questionnaire; RV, residual volume. For other abbreviations, see text.

t0015

Table 12.2 PEDro quality score of RCTs in systematic review of pelvic floor physical therapy for neurological diseases

E – Eligibility criteria specified
1 – Subjects randomly allocated to groups
2 – Allocation concealed
3 – Groups similar at baseline
4 – Subjects blinded
5 – Therapist administering treatment blinded
6 – Assessors blinded
7 – Measures of key outcomes obtained from >85% of subjects
8 – Data analysed by intention to treat
9 – Statistical comparison between groups conducted
10 – Point measures and measures of variability provided

Study	E	1	2	3	4	5	6	7	8	9	10	Total score
McClurg, 2006	+	+	–	+	–	–	–	+	+	+	+	6/10
McClurg, 2008	+	+	+	+	+	–	+	+	+	+	+	9/10
McClurg, 2010	+	+	–	+	–	–	+	+	–	+	+	6/10
Khan, 2010	+	+	+	+	–	–	–	+	+	+	+	7/10
Lucio, 2010	–	+	–	+	–	–	+	+	–	+	+	6/10
Lucio, 2011	–	+	–	+	–	–	+	+	–	+	+	6/10
Prasad, 2003	+	–	–	–	–	–	+	–	+	+	+	4/10
Tibaek, 2004	+	+	–	+	?	–	–	+	–	+	+	5/10
Tibaek, 2005	+	+	–	+	?	–	–	+	–	+	+	5/10
Tibaek, 2007	+	+	–	+	–	–	+	–	–	+	+	5/10
Vahtera, 1997	+	+	–	+	–	–	–	–	–	+	+	4/10

+, criterion is clearly satisfied; –, criterion is not satisfied; ?, not clear if the criterion was satisfied. Total score is determined by counting the number of criteria that are satisfied, except that 'eligibility criteria specified' score is not used to generate the total score. Total scores are out of 10.

Comp. by: KARajakumari Stage: Proof Chapter No.: 12 Title Name: BO
Page Number: 6 Date: 31/05/2014 Time: 05:29:00

B978-0-7020-4443-4.00012-1, 00012

s0045 ## Conclusions and clinical recommendations

p0110 Clinical recommendations based on to-date evidence promote pelvic floor exercises to reduce incontinence with special attention to education and improvement of physical functions and social interaction but conclusions have to be drawn cautiously because of limited research (Tibaek et al., 2004, 2005, 2007).

s0050 # MULTIPLE SCLEROSIS (MS)

s0055 ## Definition

p0115 MS is caused by inflammatory and demyelinating lesions in the white matter of the brain and the spinal cord, leading to a wide variety of neurological deficits (Chancellor and Blaivas, 1995).

s0060 ## Incidence and prevalence

p0120 The disease has an incidence of approximately 1 new case per 10 000 people every year, mostly manifesting between the ages of 20 and 50 years. MS is more common in women than in men by a ratio of 2:1. The prevalence is about 1 per 1000 in the United States and 2 per 1000 in North Europe. MS is less common in Orientals (Leboeuf and Gousse, 2004).

s0065 ## Urologic and bowel symptoms

p0125 Urologic symptoms in MS patients vary greatly from one study to another. Urgency, reported in 24–86% of the cases, and frequency, between 17% and 82% are the most frequent symptoms in the MS population (Mayo and Cchetner, 1992; Leboeuf and Gousse, 2004). Urgency incontinence is reported in 19 to 72% while hesitancy and retention is found in 2 to 49% of MS patients (Leboeuf and Gousse, 2004; Mayo and Chetner, 1992). Constipation was found in 54% of the MS patients while 29% experienced faecal incontinence (Hennessey et al., 1999). All these symptoms are rated as the third most important problem in MS after spasticity and incoordination, limiting patients' ability to work (Jawad et al., 1999). In men and women with MS not all the urologic dysfunctions can be presumed to be secondary to MS. A poor correlation has been found between subjective symptoms and objective urodynamic evaluations (Chancellor and Blaivas, 1995).

TS2

s0070 ## Pathophysiology

p0130 Damage to the innervation of the lower urinary tract mostly affects the sphincter and the detrusor. Three main types of pattern of urodynamic dysfunction are described:

- detrusor hyperreflexia without bladder outlet obstruction will occur in 26–99% of MS patients; u0035
- detrusor hyperreflexia with detrusor-external sphincter dyssynergia (DESD) is documented in 23–52% of MS patients; u0040
- MS patients with detrusor hypo- or areflexia are seen in 6–40% of the cases (Chancellor and Blaivas, 1995; Gallien et al., 1998; Leboeuf and Gousse, 2004). u0045

s0075 ## Treatment: evidence for effect (prevention and treatment)

p0150 A few authors investigated physical therapy as a treatment modality in MS patients but without a control group (Van Poppel et al., 1985; Primus, 1992; Klarskov et al., 1994; De Ridder et al., 1999; Skeill et al., 2001) and noted a good subjective improvement in incontinent episodes and pad use after electrical stimulation or biofeedback training. Primus (1992) gave maximal vaginal electrical stimulation on 27 MS patients and found an initial efficacy of 85% but a decrease during follow up to 18% after 3 months. They concluded that long-term treatment is necessary to minimize symptoms in the MS population. De Ridder et al. (1999) offered a practical tool in the selection of MS patients to predict good prognosis: pelvic floor physical therapy should be restricted to patients with mild MS, without pelvic floor spasticity or detrusor sphincter dyssynergia. They designed a digital scoring system for pelvic floor spasticity based on experience:

1 = spastic muscle unable to relax even after passive elongation; u0050

2 = hypertonic muscle with temporary relaxation after elongation; u0055

3 = active relaxation after active contraction. u0060

This digital test has proven to be reliable between examiners (r = 0.90).

p0175 Bowel management in MS patients is empirical with a lack of evidence. Only one study investigated the effect of physical therapy but without a control group. Wiesel et al. (2000) offered biofeedback training as treatment in 13 patients with MS complaining of constipation or faecal incontinence. Five patients experienced a beneficial effect of biofeedback. Treatment was more likely to be successful in patients with limited disability and a non-progressive disease course.

s0080 ## Evidence-based medicine on MS and pelvic floor physical therapy

p0180 Evidence-based medicine on pelvic floor physical therapy for MS was researched in eight studies (see Table 12.1).

p0185 Seven studies described the efficacy of physical therapy to *reduce urgency, frequency, incontinence, nocturia* and *bladder emptying*. Vahtera et al. (1997) investigated the effect of electrical

BO, 978-0-7020-4443-4

Comp. by: KARajakumari Stage: Proof Chapter No.: 12 Title Name: BO
Page Number: 7 Date: 31/05/2014 Time: 05:29:00

B978-0-7020-4443-4.00012-1, 00012

stimulation and pelvic floor muscle exercises on lower urinary tract symptoms in multiple sclerosis patients (MS) with near-normal post-void residual volumes (<100 ml) and mild MS. The control group was not treated nor even tested on activity of the pelvic floor. Electrical stimulation (ES) with interferential currents in combination with regular pelvic floor exercises improved significantly urgency, frequency, incontinence, nocturia and bladder emptying in comparison with a control group without treatment. The therapy significantly improved the maximal strength and endurance of the pelvic floor muscles. Compliance with the pelvic floor muscle exercises was 62.5% after 6 months; others trained irregularly. Three patients relapsed because of appearance of bladder symptoms or severe relapses in MS. Men may respond more rapidly to the therapy for incontinence. The symptoms of urgency were relatively easy to reduce in women. Lucio et al. (2010) randomized 27 female MS patients in a group that received PFMT with a vaginal perineometer and a sham group where the perineometer was introduced but no contractions were asked. They concluded that PFMT is an effective approach to treat lower urinary tract dysfunction (LUTD) in MS. In a second study of 35 MS patients (Lucio et al., 2011), they assessed QoL and found again results in favour of PFMT compared to sham therapy. Khan et al. (2010) assessed the effectiveness of a 6-week bladder rehabilitation programme in 40 persons with MS with a control waitlist group (n =34). A multifaceted, individualized rehabilitation programme reduced disability and improved QoL in MS patients compared with no intervention after 12 months of follow-up.

p0190 McClurg et al. (2006) compared three treatment modalities in 30 people with MS: PFMT and advice; PTMT, advice and EMG biofeedback (BF); and a third group adding neuromuscular electrical stimulation (NMES). They found a statistical significant difference between groups 1 and 3 for number of leaks and pad-test and a statistical benefit for group 2 compared with group 1 for pad-test. In a second study (McClurg et al., 2008), they found a statistical superior benefit by adding NMES to a programme of PFMT and EMG-BF on LUTD in 74 MS patients. Prasad et al. (2003) compared in 28 MS patients lower abdominal pressure with external bladder stimulation and no therapy to aid bladder emptying. All patients received all therapies during 2 weeks but were randomized in the sequence of therapy. Analysis was only done after 6 weeks for the whole group. The difference between abdominal pressure and vibration just failed to reach significance (p = 0.059) but both therapies were more effective than no treatment. There was no significant reduction in either the frequency of micturition or episodes of incontinence (see Table 12.1).

p0195 One study investigated the effect of abdominal massage against advice for the *alleviation of constipation* in 30 patients with MS and found a significant difference in favour of the massage (McClurg et al., 2011).

Clinical recommendations

s0085

p0200 Based on evidence to date, electrical stimulation and pelvic floor exercises in MS patients decreases urgency, frequency, incontinence, nocturia and improves bladder emptying and pelvic muscle activity. Abdominal massage is effective to reduce constipation. Further research will establish the efficacy of these interventions.

CONCLUSION

s0090

p0205 Conclusions and clinical recommendations on the role of pelvic floor physical therapy for genitourinary and bowel problems in specific neurological diseases as stroke have to be taken with care because of the lack of good randomized controlled trials with a sufficient number of patients. A significant improvement of incontinence in stroke patients was demonstrated offering a 12-week PFME group treatment while QoL was the same for the experimental and control group.

p0210 For MS patients, a significant difference in lower urinary tract symptoms and pelvic floor muscle activity was found after electrical stimulation, biofeedback and pelvic floor muscle exercises or bladder training compared with a control group without specific treatment or with one modality of treatment. Abdominal massage has a positive effect on the symptoms of constipation.

p0215 The methodological quality of recent studies is high.

p0220 For patients with other neurological disorders, efficacy of physical therapy is not yet investigated.

p0225 Research on efficacy and selection criteria for pelvic floor physical therapy is necessary to help neurological patients to prevent urological and bowel complications and to improve quality of life. Future research has to be undertaken not only on stroke and MS but also on other neurological diseases.

REFERENCES

Brittain, K., Peet, S.M., Castleden, C.M., et al., 1998. Stroke and incontinence. Stroke 29, 524–528.

Brocklehurst, J.C., Andrews, K., Richards, B., et al., 1985. Incidence and correlates of incontinence in stroke patients. J. Am. Geriatr. Soc. 33, 540–542.

Chancellor, M.B., Blaivas, J.G., 1995. Practical Neuro-urology. Genitourinary Complications in Neurologic Disease. Butterworth-Heinemann, Boston, p 119–137.

De Ridder, D., Vermeulen, C., Ketelaer, P., et al., 1999. Pelvic floor rehabilitation in multiple sclerosis. Acta Neurol. Belg. 99, 61–64.

Flisser, J.A., Blaivas, J.G., 2004. Cerebrovascular accidents, intracranial tumors and urologic consequences. In: Corcos, J., Schick, E. (Eds.), Textbook of the Neurogenic bladder.

Comp. by: KARajakumari Stage: Proof Chapter No.: 12 Title Name: BO
Page Number: 8 Date: 31/05/2014 Time: 05:29:00

Adults and Children. Martin Dunitz/Taylor & Francis Group, London, pp. 305–313.

Gallien, P., Robineau, S., Nicolas, B., et al., 1998. Vesicourethral dysfunction and urodynamic findings in multiple sclerosis: a study of 149 cases. Arch. Phys. Med. Rehabil. 79, 255–257.

Gross, J.C., et al., 2000. Urinary incontinence and stroke outcome. Arch. Phys. Med. Rehabil. 81, 22–26.

Harari, D., Norton, C., Lockwood, L., et al., 2004. Treatment of constipation and fecal incontinence in stroke patients. Randomized controlled study. Stroke 35, 2549–2555.

Hennessey, A., Robertson, N.P., Swingler, R., et al., 1999. Urinary, faecal and sexual dysfunction in patients with multiple sclerosis. J. Neurol. 246, 1027–1032.

Ishigooka, M., Hashimoto, T., Hayami, S., 1996. Electrical pelvic floor stimulation: a possible alternative treatment for reflex urinary incontinence in patients with spinal cord injury. Spinal Cord 34 (7), 411–415.

Jawad, S.H., Ward, A.B., Jones, P., et al., 1999. Study on the relationship between premorbid urinary incontinence and stroke functional outcome. Clin. Rehabil. 13, 447–452.

Jorgensen, L., Engstad, T., Jacobsen, B.K., 2005. Self-reported urinary incontinence in noninstitutionalized long-term stroke survivors: a population-based study. Arch. Phys. Med. Rehabil. 86, 416–420.

Khan, F., Pallant, J.F., Pallant, J.I., et al., 2010. A randomised controlled trial: outcomes of bladder rehabilitation in persons with multiple sclerosis. J. Neurol. Neurosurg. Psychiatry 81 (9), 1033–1038.

Klarskov, P., Heely, E., Nyholdt, I., et al., 1994. Biofeedback treatment of bladder dysfunction in multiple sclerosis: a randomised trial. Scand. J. Urol. Nephrol. 157, 61–65.

Krogh, K., Christensen, P., Laurberg, S., 2001. Colorectal symptoms in patients with neurological diseases. Acta Neurol. Scand. 103, 335–343.

Leboeuf, L., Gousse, A.E., 2004. Multiple sclerosis. In: Corcos, J., Schick, E. (Eds.), Textbook of the Neurogenic bladder. Adults and Children. Martin Dunitz/Taylor & Francis Group, London, pp. 274–292.

Lucio, A.C., Campos, R.M., Perissinoto, M.C., et al., 2010. Pelvic floor muscle training in the treatment of urinary tract symptoms in women with multiple sclerosis. Neurourol. Urodyn. 29 (8), 1410–1413.

Lucio, A.C., Perissinoto, M.C., Natalin, R.A., et al., 2011. A comparative study of pelvic floor muscle training in women with multiple sclerosis: its impact on lower urinary tract symptoms and quality of life. Clinics 66 (9), 1563–1568.

Mayo, M.E., Chetner, M.P., 1992. Lower urinary tract dysfunction in multiple sclerosis. Urology 1, 67–70.

McClurg, D., Ashe, R.G., Marshall, K., et al., 2006. Comparison of pelvic floor muscle training, electromyography biofeedback, and neuromuscular electrical stimulation for bladder dysfunction in people with multiple sclerosis: a randomized pilot study. Neurourol.Urodyn. 25 (4), 337–348.

McClurg, D., Ashe, R.G., Lowe-Strong, A.S., 2008. Neuromuscular electrical stimulation and the treatment of lower urinary tract dysfunction in multiple sclerosis. A double blind, placebo controlled, randomized clinical trial. Neurourol.Urodyn. 27, 231–237.

McClurg, D., Hagen, S., Hawkins, S., et al., 2010. Abdominal massage for the alleviation of constipation symptoms in people with multiple sclerosis: a randomized controlled feasibility study. Mult. Scler. J. 17 (2), 223–233.

Nakayama, H., Jorgensen, H.S., Pedersen, P.M., et al., 1997. Prevalence and risk factors of incontinence after stroke. The Copenhagen stroke study. Stroke 28, 58–62.

Patel, M., Coshall, C., Lawrence, E., et al., 2001a. Recovery from poststroke urinary incontinence: associated factors and impact on outcome. J. Am. Geriatr. Soc. 49, 1229–1233.

Patel, M., Coshall, C., Rudd, A.G., et al., 2001b. Natural history and effects on 2-year outcomes of urinary incontinence after stroke. Stroke 32, 122–127.

Pettersen, R., Dahl, T., Wyller, T.B., 2002. Prediction of long-term functional outcome after stroke rehabilitation. Clin. Rehabil. 16, 149–159.

Prasad, R.S., Smith, S.J., Wright, H., 2003. Lower abdominal pressure versus external bladder stimulation to aid bladder emptying in multiple sclerosis: a randomised controlled study. Clin. Rehabil. 17 (1), 42–47.

Primus, G., 1992. Maximal electrical stimulation in neurogenic detrusor hyperactivity: experiences in multiple sclerosis. Eur. J. Med. 1, 80–82.

Sakakibara, R., Hattori, T., Yasuda, K., et al., 1996. Micturational disturbance after acute hemispheric stroke: analysis of the lesion site by CT and MRI. J. Neurol. Sci. 137, 47–56.

Skeill, D., Thorpe, A.C., et al., 2001. Transcutaneous electrical nerve stimulation in the treatment of neurological patients with urinary symptoms. BJU Int. 88, 899–902.

Sze, K., Wong, E., Or, K.H., et al., 2000. Factors predicting stroke disability at discharge: a study of 793 Chinese. Arch. Phys. Med. Rehabil. 81, 876–880.

Tibaek, S., Jensen, R., Lindskov, G., et al., 2004. Can quality of life be improved by pelvic floor muscle training in women with urinary incontinence after ischemic stroke? A randomised controlled and blinded study. Int. Urogynecol. J. Pelvic Floor Dysfunct. 15, 117–123.

Tibaek, S., Gard, G., Jensen, R., 2005. Pelvic floor muscle training is effective in women with urinary incontinence after stroke. A randomised controlled and blinded study. Neurourol. Urody. 24 (4), 348–357.

Tibaek, S., Gard, G., Jensen, R., 2007. Is there a long-lasting effect of pelvic floor muscle training in women with urinary incontinence after ischemic stroke? Int. Urogynecol. J. Pelvic Floor Dysfunct. 18 (3), 281–287.

Vahtera, T., Haaranen, M., Viramo-Koskela, A.L., et al., 1997. Pelvic floor rehabilitation is effective in patients with multiple sclerosis. Clin. Rehabil. 11, 211–219.

Van Poppel, H., Ketelaer, P., Van DeWeerd, A., 1985. Interferential therapy for detrusor hyperreflexia in multiple sclerosis. Urology 25, 607–612.

B978-0-7020-4443-4.00012-1, 00012

Vaughan, C.P., Juncos, J.L., Burgio, K.L., et al., 2011. Behavioral therapy to treat urinary incontinence in Parkinson disease. Neurology 76, 1631–1634.

Wiesel, P.H., Norton, C., Roy, A.J., et al., 2000. Gut focused behavioral treatment (biofeedback) for constipation and faecal incontinence in multiple sclerosis. J. Neurol. Neurosurg. Psychiatr. 69, 240–243.

Wikander, B., Ekelund, P., Milsom, I., 1998. An evaluation of multidisciplinary intervention governed by functional independence measure in incontinent stroke patients. Scand. J. Rehabil. Med. 30, 15–21.

Comp. by: KARajakumari Stage: Proof Chapter No.: 12 Title Name: BO
Page Number: 10 Date: 31/05/2014 Time: 05:29:00